



**ANNUAL
REPORT**
2012

PHILIPPINE
CARABAO
CENTER



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OPERATING

OPERATING FRAMEWORK

Mandate

The Philippine Carabao Center (PCC) operates as an attached agency of the Department of Agriculture (DA). PCC is mandated under Republic Act No. 7307 or the Philippine Carabao Act of 1992 to conserve, propagate and promote the carabao as a source of draft animal power, meat, milk and hide to benefit the rural farmers.

Per DA Administrative Order No. 9, series of 2009, PCC likewise is the lead Institution in Livestock Biotechnology research and development.

Vision

To become a premier institution promoting profitable and sustainable carabao-based enterprises designed to improve the income and nutrition of rural farming communities.

Mission

Improve the general well-being of rural farming communities through carabao genetic improvement, technology development and dissemination, and establishment of carabao-based enterprises, thus ensuring higher income and better nutrition.

framework

Powers and Functions

RA 7307, which was signed on March 27, 1992 and operationalized on April 1, 1993, provides that PCC's powers and functions are:

- Conserve, propagate and promote the Philippine carabao as a source of draft animal power, meat, milk and hide;
- Enable the farmers, particularly smallholder-farmers and CARP beneficiaries, to avail themselves of good quality carabao stocks at all times and at reasonable prices through an organized program of production, breeding, training, and dispersal;
- Undertake training programs for farmers, particularly smallholder-farmers and CARP beneficiaries, designed to transfer technology on the proper care and reproduction of the carabao and the processing of its meat and milk;
- Encourage backyard dairy development in rural areas by raising carabaos so as to meet the nutritional needs of the smallholder-farmers and their families and reduce dependence on imported milk by-products;
- Undertake research activities in all disciplines that lead to the improvement of the overall productivity of the Philippine carabao;
- Increase the existing annual population growth of the Philippine carabao to keep pace with human population growth;
- Enter into memoranda of agreement and receive donations through the Department of Agriculture from local and foreign sources. Upon the recommendation of the PCC Advisory Board, the individual carabao centers may enter into agreements directly with funding agencies through their respective board of regents or head of agency;
- Additional responsibilities per DA Administrative Order 9 Series of 2008 as the national lead agency for livestock biotechnology research and development.

EXECUTIVE

EXECUTIVE SUMMARY

Genetic Improvement Program

Through the agency's desire to continuously improve and conserve the animal's elite genetic traits, the PCC is implementing a centralized data recording system. The best genetics are then extracted from sustained selection, evaluation, and testing that is utilized for extensive upgrading of domestic swamp buffalo stocks through artificial insemination.

Continuous backcrossing for at least three generations for crossbreds produced between the dairy breed and indigenous swamp buffalo is being practiced. This is to ensure a population of highly productive backcrosses with genetic potentials equivalent to its dairy-type parents.

Through the expanded AI program, AI technicians from the local government units (LGU) and PCC extensively work together in delivering quality AI services nationwide. Two hundred twenty seven AI technicians were trained in 2012 in the five PCC training centers (PCC at CLSU, PCC at CMU, PCC at CSU, PCC at UPLB, and PCC at USF). The regular conduct of AI training is aimed at paving the way for the privatization of AI services and further expansion of AI services. Complementary to the AI program is the sustained implementation of the Bull Loan program.

While the agency aggressively pursue genetic improvement program, the indigenous germplasm of the existing Philippine (native) carabaos are carefully conserved. This effort is institutionalized through the gene pool for native carabao, both in-situ (natural) and ex-situ (in vitro). Two of the agency's regional centers, PCC at Cagayan State University and the PCC at Ubay Stock Farm, and some farmer-communities, are currently into conservation, propagation, and selection within breed. Of which, a total of 948 native carabaos are recorded in these sites for 2012.

summary

Carabao-based Enterprise Development

More smallholder carabao raisers across the PCC Regional Impact Zones (RIZ), particularly those owning crossbreds produced out of the AI and Bull Loan programs, were organized into 84 cooperatives or associations in 2012.

The same effort can be seen at the National Impact Zone (NIZ) in Nueva Ecija where one new dairy cooperative with 24 farmer-cooperators was created and entrusted with 24 female Brazilian buffaloes.

Aside from the carabao-based modules, some 50 organized smallholder farmers also benefit from a buffalo grow-out project in Lupao and Pantabangan in Nueva Ecija.

The existing carabao-based modules, on the other hand, continue to significantly contribute in the sustained implementation of the carabao-based enterprise development program across the PCC network.

Notable dairy cooperatives in the RIZ, particularly those that are based in Cavite, Laguna, Batangas, Rizal, Bulacan, Pampanga, Pangasinan, Cagayan, Isabela, Ilocos Norte, Cebu, and Bohol contributed a total of 326,234 kg of milk to the local dairy industry.

At the NIZ, the Nueva Ecija Federation of Dairy Carabao Cooperatives (NEFEDCCO) posted a total of 456,259.56 kg of raw milk to the milk pool. The produce were either sold raw to processors in Bulacan and Metro Manila or immediately processed into dairy products.

Integral to the sustained success of the program is the provision of technical and infrastructure support. Dairy farmers are now benefitted in this purpose through the establishment of the Central Milk Processing Plant. The facility was designed to absorb the processing requirements of milk produced in Regions 1, 2, and 3. From January to December 2012, the plant has accepted a total of 149,744.86 kg milk from the National Gene Pool, NEFEDCCO, and other dairy cooperatives.

To complete the dairy supply chain, a dairy products outlet named “Milka Krem”,

EXECUTIVE

was established and formally opened to the public in November 2012.

Convergence efforts with the partner LGUs also resulted in the establishment of two community-based milk processing plants in Brgy. Bantug, Asingan, Pangasinan and San Agustin, Isabela in 2011. These were meant to spearhead local dairy development.

In support of the processing plant in San Agustin, four milk collection stations in strategic sites were also established in 2012 through the financial support of the Provincial Government of Isabela.

Similar initiatives are in progress in Visayas and Mindanao. The village-based dairy processing plant building has been set up in PCC at CMU, Maramag, Bukidnon and the processing equipment will be installed in 2013.

Relative to these initiatives, capability building support to cooperatives, association, and individual farmers are conducted.

Research and Development

The deliberate efforts of PCC in its livestock biotechnology researches are evident in its constant presence both in local and international scientific events.

In October, the PCC co-hosted the joint conference on 9th Asian Reproductive Biotechnology Society Congress and the 49th Annual Philippine Society of Animal Science convention which were attended by scientists, scholars, extension workers, and policy-makers from across the globe.

Its active participation in these areas includes presentation of research posters and papers. As a result, seven papers were published in refereed journals while eight were included in scientific proceedings. An additional six papers were already proofread while another six are still being reviewed.

From these initiatives, its researchers and scientists were given various awards on their respective research presentations. Two of its scientists were likewise awarded as the “2012 PSAS Distinguished Fellow” and as the “2012 PSAS Distinguished Researcher in Veterinary Medicine”.

summary

In 2012, a total of 25 researches (22 basic and 3 applied or operations) were completed while 39 (33 basic and 6 applied) are on-going.

The basic researches focused on animal nutrition, animal health, molecular genetics and breeding, reproductive biotechnology, reproductive physiology, anatomy/physiology, and socio-economics.

Operations researches, on one hand, dealt on increasing calf production/reducing calf mortality, increasing forage productivity, reducing calving interval, and increasing milk production.

During the agency's annual R&D In-house review, 27 papers (17 completed and 10 on-going) were presented.

The PCC has also conducted a series of technical seminars on various topics related to animal health, animal nutrition, rumen biotechnology, and advanced techniques on reproductive biotechnology.

In 2012, the PCC was able to gain external funding for its R&D projects from the Philippine Council for Agriculture, Aquatic, Natural Resources Research and Development (PCAARRD). This project funding covered a total of eight new projects under three umbrella R&D programs. These projects are scheduled for implementation in 2013.

Consequently, the efforts being done in PCC continue to attain media mileage from local and national media. The agency ensured that development of IEC materials is continuously improved and sustained. From which, a total of 15 different publications were published and circulated. These materials include the PCC Newsletter, PCC Balita, R&D Highlights, and updated corporate primer, PCC Publications' Catalogue, coffee-table book on carabao festivals, technology poster on artificial insemination (AI), AI service recipient booklet, AI flyer, 9th Asian Reproductive Biotechnology Society congress proceedings, and souvenir program.

To constantly deliver quality services, the PCC continuously develops strategies in strengthening and improving its service-delivery and processes following International Standards being an EMS-ISO, OHSMS-OHSAS, and ISO certified institution.

GENETIC improvement

Genetic Improvement Program

Purebred Dairy Buffaloes

National Gene Pool. The National Gene Pool (NGP), situated within the compound of the PCC National Headquarters, is where breeding, selection, and genetic evaluation procedures for purebred (riverine) dairy buffaloes are being practiced. As of December 2012, 576 (467 Bulgarian Murrah and 109 Brazilian Murrah; 224 of these numbers are female breeders) are maintained for the purpose with calving interval of 15 months. Mortality rates were kept to a minimum at 0.80% for pre-weaning calves, 1.40% for post-weaning calves, and 0.92% for adults.

Meanwhile, 16 elite bulls were selected based on their estimated breeding values (EBVs) and were brought to the National Bull Farm for subsequent training as semen donors for the nationwide AI Program. The rest of the bulls were also selected and distributed for natural mating under the Bull Loan Program.

Regional Centers. Aside from those kept at the NGP, purebred dairy buffaloes numbering to 1,256 (164 Indian Murrah, 878 Bulgarian, 118 American Murrah, and 96 Brazilian) are also maintained at the institutional facilities of the agency's 13 regional centers. Of this total, 578 are breedable females. The average calving interval for the purebreds was 18.01 months (at a range of 13.5-22.2 months).

Like the NGP animals, these institutional herds are registered in the PCC-wide recording system, which generates data that are subjected to genetic evaluation.

National and Regional Impact Zones. Purebred dairy buffaloes are also entrusted to farmer-cooperators in the National Impact Zone (NIZ) in Nueva Ecija and in the Regional Impact Zones (RIZs) of the 13 network centers. As of December, 2012, the inventory of purebreds in these areas has already reached 4,098 (Table 1).

The institutional herds are registered in the PCC-wide recording system, which generates data that are subjected to genetic evaluation.

Table 1 Purebred dairy buffalo inventory in the NIZ and RIZs.

Location/Particulars	Breeds				Total
	Bulgarian Murrah	Brazilian Murrah	American Murrah	Murrah	
A. National Impact Zone			None	None	
Pregnant	136	324	-	-	460
Non Pregnant	385	1,142	-	-	1,527
Female Calves	88	354	-	-	442
Male Calves	94	390	-	-	484
Junior/Adult Bulls	77	-	-	-	77
Subtotal	780	2,210			2,990
B. Regional Impact Zones		None			
Pregnant	147	-	28	1	176
Non Pregnant	515	-	49	6	570
Female Calves	86	-	13	1	100
Male Calves	70	-	12	1	83
Junior/Adult Bulls	168	-	11	-	179
Subtotal	986		113	9	1,108
TOTAL	1,766	2,210	113	9	4,098

In the NIZ, milk production, %fat, and %protein of individual buffalo cow per cooperative were also determined based on a monthly milk test-day for a complete lactation period of about 10 months (adjusted to 305 days).

In 2012, a total of 2,079 test-day milk samples were collected from 12 primary cooperatives and subjected to laboratory and data analyses.



Philippine Swamp Buffaloes

The PCC at Cagayan State University (in Piat, Cagayan) and PCC at Ubay Stock Farm (in Ubay, Bohol) have continued with the raising and management of native carabaos (swamp buffaloes) on-station (ex situ) and through the cooperation of farmer-communities (in situ) for purposes of conservation, propagation, and selection within breed. As of December 2012, the total inventory has reached 948 in these sites (Table 2). Data on reproductive and growth performance are gathered regularly and analyzed accordingly.

Table 2 Inventory of native carabaos at the PCC at CSU and PCC at USF

Location/Particulars	No. of Head					Total
	Male Calf	Female Calf	Heifer	Cow	Bull	
A. PCC at CSU						
a.1 Ex situ (Piat, Cagayan)	6	6	27	31	19	89
a.2 In situ						
• Villarey, Piat, Cagayan	-	-	3	11	4	18
• Bangad, Tinglayan, Kalinga	-	-	-	19	1	20
B. PCC at USF						
a.1 Ex situ (Ubay, Bohol)	18	12	22	34	11	97
a.2 In situ						
• Pres. Carlos P. Garcia, Bohol	-	-	-	533	191	724
TOTAL	24	18	52	628	226	948

National Crossbreeding Program

Crossbreeding the native carabaos with purebred dairy buffalo breeds and successive backcrossing of the produced crossbreds with purebreds aim to develop ultimately a Philippine dairy breed that is adaptable to local conditions. This breeding scheme is done in the villages nationwide through artificial insemination (AI) and natural mating by way of the Bull Loan Program.

Artificial Insemination. A total of 79,276 buffaloes owned by 55,000 farmers were artificially inseminated in some 9,000 barangays within the 952 municipalities and cities in the 75 provinces of the country's 16 regions. These AI services were done by 996 field technicians (434 are village-based or VBAITs, 81 are from PCC, and 481 are from the local government units (LGUs) or provincial veterinary office or PVO).

An additional 227 AI technicians (VBAIT=110, LGU/PVO=74, RFU=1, NDA=15, Private individuals=8 and PCC=19) were also trained in 2012 in the five PCC Training Centers (PCC at CLSU, PCC at CMU, PCC at CSU, PCC at UPLB, and PCC at USF), which added to the pool of trained AI Technicians in the country.

In support of the AI Program, the semen processing facilities at the PCC at CLSU and PCC at UPLB have produced 211,382 doses of frozen semen, which were deposited in the PCC's semen (or cryo-) bank. Of this total, 136,512 doses were distributed to the PCC's regional centers and other partner-individuals or agencies while the remaining doses were stored for reference or for future research work. Also, as part of the protocols for performance testing, the PCC's cryobanking program requires that each "bull in waiting" needs to have at least 2,500 doses of semen to be stored in the cryobank as a safeguard in case the bulls are no longer available when the performance of their daughters are determined eventually.

To maintain the quality and viability of the frozen semen for AI, the PCC through its Genetic Improvement Program (GIP) Unit has also distributed some 1,394 dewars of liquid nitrogen to its regional centers and various partner-clienteles nationwide.

Bull Loan Program. Complementing the AI service especially in areas where it is not readily accessible is the natural mating of buffaloes via the Bull Loan Program. In 2012, an additional 152 breeding bulls were loaned out for the purpose. This brings to a total of 918 purebred breeding bulls currently in the care of farmer-bull handlers all over the country.



Cryobanking is PCC's proactive approach to protect animal genetic diversity for food and agriculture

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Complementing the AI service, an additional 152 breeding bulls were loaned out. This brings to a total of 918 purebred breeding bulls currently in the care of farmer-bull handlers all over the country.



ENTERPRISE development

Enterprise Development Program

Newly Created Carabao-Based Modules

The program aims at creating more income-generating opportunities for the smallholder carabao raisers. For purpose of expansion, the PCC mobilized and helped organize more carabao owners particularly those owning crossbreds produced out of AI and Bull Loan programs in the Regional Impact Zones (RIZs). In 2012, 84 new cooperatives or associations in 12 regions of the country were organized for the purpose.

At the National Impact Zone (NIZ) in Nueva Ecija, one cooperative was organized, which is composed of 24 farmer-cooperators who were entrusted with 24 female Brazilian buffaloes. Overall, a total of 1,217 farmer-cooperators from 56 primary cooperatives, were entrusted with dairy buffaloes. They are strategically located in the 17 municipalities and three cities in Nueva Ecija.

Fifty smallholder farmers were also organized and engaged in the implementation of a Buffalo Grow-out Project in Lupao and Pantabangan, Nueva Ecija. The project aims to provide care and management for calves given to PCC as its share under the terms of the dairy buffalo module. Female and male calves are managed by farmer-raisers in the grow-out areas until breeding age. After which, the animals are entrusted to qualified farmer-cooperators in Nueva Ecija or neighboring provinces for breeding and/or dairying purposes. Male buffaloes that are not fit for breeding are sold for meat.

Existing Carabao-Based Modules

There are 43 existing cooperatives and 84 newly organized associations or cooperatives composed of 3,544 carabao owners who are engaged in carabao-based enterprises, which are mostly located in the RIZs in Luzon and Visayas. The most notable dairy buffalo cooperatives based in Cavite, Laguna, Batangas, Rizal, Bulacan, Pampanga, Pangasinan, Cagayan, Isabela, Ilocos Norte, Cebu, and Bohol contributed a total of 326,234 kg of milk to the local dairy industry.

At the NIZ, there are 55 existing dairy cooperatives consisting of 1,217 smallholder farmers managing a total population of 2,990 Bulgarian and

There are 43 existing cooperatives and 84 newly organized associations or cooperatives composed of 3,544 carabao owners who are engaged in carabao-based enterprises, which are mostly located in the RIZs in Luzon and Visayas.

Brazilian buffaloes whose cooperatives comprise the Nueva Ecija Federation of Dairy Carabao Cooperatives (NEFEDCCO).

The NEFEDCCO posted a total of 456,259.56 kg of raw milk to the milk pool. Portion of which was sold to processors in Bulacan and Metro Manila while the rest was sold as processed milk products (such as pastillas, kesong puti, and flavored milk) to the local communities.

Infrastructure Support to the Dairy Cooperatives

A Central Milk Processing Plant, with a capacity of 1,000 kg per hour, was completed in March 2011, which also marked its initial operation. It is adjacent to the PCC National Headquarters, Science City of Muñoz, Nueva Ecija. It was designed to absorb the processing requirements of milk produced in Regions 1, 2, and 3.

From January to December 2012, the plant has accepted a total of 149,744.86 kg milk from the National Gene Pool, NEFEDCCO, and other dairy cooperatives. It has also processed a total of 151,042.92 kg of milk for the year. The difference of 1,298.06 kg from the accepted and processed milk was accounted from the remaining inventory of milk in December 2011.

To complete the dairy supply chain, a dairy product outlet named “Milka Krem”, was established and formally opened to the public in November 2012.

Two Community-based Milk Processing Plants with 300-liter to 500-liter capacity were also constructed in Brgy. Bantug, Asingan, Pangasinan and San Agustin, Isabela in 2011. These plants were the results of convergence efforts by the local government units (LGUs), cooperatives, and the PCC. The LGUs provided the land (site), the PCC contributed the processing plant (the building and equipment acquisition have been completed, though, the latter has yet to be set-up in 2013), while the cooperatives take care of operating the facility. These were meant to spearhead local dairy development.

The San Agustin Dairy Associations Cooperative (SODACO) operates the community-based milk processing plant in San Agustin. In support of the processing plant, four milk collection stations in strategic sites were also established in 2012 through the financial support of the Provincial Government of Isabela.

Similar initiatives are in progress in Visayas and Mindanao. The village-based dairy processing plant building has been set up in PCC at CMU, Maramag, Bukidnon and the processing equipment will be installed in 2013. On the other hand, construction of the same facility in PCC at USF, Ubay, Bohol is still being negotiated. These will serve as toll dairy processing facilities for smallholder-farmers in the said areas.

Capability Building Support to the Cooperatives, Associations, and Individual Farmers

A series of trainings on the various aspects of establishment, expansion, and maintenance of the newly created and existing cooperatives or associations was organized and implemented in collaboration with government and non-government entities. There were 283 of such training courses (e.g., social preparation, dairy production, dairy processing, milk handling, cooperativism, leadership, cooperative management, and business planning for smallhold dairying) participated in by 9,534 farmer-participants spread out nationwide in the service areas of the PCC.

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RESEARCH & development

Biotechnology is being complemented by relevant researches that directly explore and address problems or issues that are being encountered in the course of the agency's implementation of its many programs, which include farm and field operations.

Research and Development

Basic and Applied (Operations) Researches

The PCC's accomplishments in the field of R&D are manifested in the conduct of basic and applied researches in various disciplines and thematic areas that are consistent with the agency's long-term R&D Agenda. Livestock biotechnology continues to be at the forefront of PCC's R&D priorities following its designation in 2008 by the DA as the lead agency for the purpose. As such, it has also included other livestock species (e.g. cattle, goat, and swine) besides water buffalo in its scientific inquiry. Biotechnology is being complemented by relevant researches that directly explore and address problems or issues that are being encountered in the course of the agency's implementation of its many programs, which include farm and field operations.

In 2012, 25 researches (22 basic and 3 applied) were completed while 39 (33 basic and 6 applied) are on-going (Tables 3 and 4 and Appendices 1a and 1b). These researches were also presented for evaluation during the agency's R&D In-House Review held on May 29-30, 2012 at the PCC National Headquarters.

Table 3 Type, numbers, and status of Basic Researches

Field	Completed	Ongoing
Animal Nutrition	3	4
Animal Health	8	8
Molecular Genetics and Breeding	2	5
Reproductive Biotechnology	1	7
Reproductive Physiology	4	1
Anatomy/Physiology	2	-
<i>Socio-economics</i>	2	8
TOTAL	22	33

Table 4 Type, numbers, and status of Applied (Operations) Researches

Thematic Area	Completed	Ongoing
Increasing calf production/reducing calf mortality	1	-
Increasing forage productivity	1	4
Reducing calving interval	-	1
Increasing milk production	1	1
TOTAL	3	6

Highlights of Some Completed R&D Activities

Molecular Genetics

a. Characterization of the Swamp and Riverine Buffalo Genome: Single Nucleotide Polymorphism Detection in Buffaloes Associated with Milk and Milk Component Traits.

The study made use of SNP genotyping to verify markers with significant difference or those that indicate desirable milk production traits. As a reference, 17 cattle genes that are associated with milk production traits based on published literature were used. A total of 65 primers (out of 114) were optimized for the said traits using the buffalo's DNA. Some 25 buffalo cows of known production records were genotyped for each of the potential SNP marker. Based on DNA sequence analysis, a total of 35 potential SNPs associated with milk production traits were subsequently identified. Seventeen of which have genotype means with significant difference in at least one of the five production traits namely milk yield, fat yield, protein yield, % fat and % protein.

b. Use of DNA Fingerprinting and Other Molecular Markers in Genetic Resource Conservation and Improvement of Water Buffaloes: Parentage Testing Using Microsatellite Markers.

The study aimed to identify sets of molecular (microsatellite) markers for use in establishing breed purity in swamp buffalo gene pools. It tested 12 microsatellite markers on eight sire-dam-offspring sets from the PCC at UPLB herd. There were seven candidate bulls. Using the Cervus software, seven of the eight offsprings matched the claimed sire (bull) with 95% confidence.

Animal Health

a. Detection of Enzootic Bovine Leukosis in Cattle Using Nested Polymerase Chain Reaction Assay.

Using nested PCR assay, 11 out of 300 blood samples of cattle collected in five random areas in the country were found positive with BLV. This was the first time that the said infection in cattle was detected in the country. Because there is still no cure for BLV, preventive measures when handling cattle or buffalo were recommended which include the use of individual sterile needle for injection and blood collection, replacement of examination gloves, disinfection of dehorning equipment, and washing and rinsing of instruments in warm water with appropriate disinfectant.

b. Molecular Detection and Classification of a Theileria Species in Cattle in the Philippines.

Using PCR method, 292 blood samples of cattle from Laguna (147), Pangasinan (40), Cebu (77), and Bohol (28) were collected and tested for Theileriosis. A



Theileria species was detected in 43 out of the 292 blood samples, which was, nonetheless, classified as benign or non-pathogenic.

c. Evaluation of Two DNA Extracting Methods for Sensitive Detection of Mycobacterium bovis in Spiked Milk Using Polymerase Chain Reaction Assay.

Two DNA extracting methods namely CTAB/Phenol: chloroform: isoamyl alcohol and EXTRAGEN MB were used to detect *M. bovis* (causative agent for bovine tuberculosis) in spiked milk (experimentally infected milk with cultured bacteria). Results showed that EXTRAGEN MB DNA extraction kit, a mycobacterial extraction reagent, enabled the removal of inhibitors present in the spiked milk for the successful extraction of DNA. The result obtained from the PCR assay also showed that it is effective in isolating amplifiable DNA as low as two bacilli per reaction. This process requires less sample manipulation which is very sensitive for animals that only shed minimal amount of bacteria compared with CTAB extraction, which requires up to 2,000 bacilli per reaction.

Animal Nutrition and Herd Management

a. Development and testing of Total Mixed Ration (TMR) for Growing Buffaloes.

Fifteen purebred Bulgarian buffaloes aged eight months (post-weaning) to 17 months were subjected to feeding trials that involved TMR prepared by mixing together roughage (chopped napier and fresh ipil-ipil leaves) and concentrate mixture (basically consisted of rice bran, premium starter, molasses, and salt) in three different (roughage:concentrate) ratios, i.e., T1=90:10, T2=70:30, and T3=80:20. The animals in the T3 group recorded the highest feed conversion efficiencies and highest return above feed cost.

b. Comparative study on the performance of calves fed w/ buffalo milk, cattle milk and milk replacer.

There was a significant difference on the effects of pure buffalo's milk over the cattle's milk and milk replacer in terms of average daily gain (ADG) but not on the water, forage, and concentrate intakes and health status of the calves. Milk replacer proved to be more economical than the two milk rations (cattle's and buffalo's milk).

c. Augmented feeding with bypass amino acid and slow release NPN supplements for dairy buffaloes.

The pure by-pass amino acid or slow released NPN supplements had no effect in improving the milk-peak and persistency of lactation of Brazilian buffaloes. But when these two supplements were combined in the ration of dairy buffaloes, the milk peak and lactation persistency were improved.

d. Milk Production Performance Evaluation of BMB Milking Herd of PCC at CMU.

The study has demonstrated the benefits derived from full grazing management system with strategic supplementation for the dairy buffaloes at the PCC at CMU. Average daily milk production per animal in a full grazing system on a grass-legume pasture was 5.49 liters from 2007 to 2011 with the highest at 6.14 liters in 2008. Calving interval was also shortened from 19 months in 2007-2008 to 16-17 months in 2009-2011.

Reproductive Biotechnology

a. Effect of Cysteamine on Oocyte In-Vitro Maturation and Developmental Competence of Pre-Implantation Embryos in Goats.



The study aimed at determining (a) the maturation rate of goat's oocytes following IVM in different concentrations of cysteamine based on first polar body extrusion and (b) the cleavage and blastocyst development during subsequent culture in vitro. Results showed that there was no significant difference in the maturation rate of goat's oocytes. However, the rate of cleavage (at two cell stage) and the development to blastocyst stage had significant difference using 100 μ M cysteamine.

R&D In-house Review and PSAS Lecture Series

There were 27 papers (17 completed and 10 on-going) presented during the In-house Review held on May 29-30, 2012.

Three professors-researchers from the Animal and Dairy Science Cluster-University of the Philippines at Los Baños (ADSC-UPLB) served as the panel of evaluators for the in-house review namely Dr. Jose Arceo N. Bautista (University Extension Specialist III), Mr. Medino Gedeun N. Yebron Jr. (Assistant Professor II), and Mr. Amado A. Angeles (Assistant Professor).

The following researchers and their respective studies were recognized:

- a. "Detection of Caprine Arthritis-Encephalitis Virus from Goats Using Competitive ELISA and Nested Polymerase Chain Reaction" by Justin Christian Gonzales of the College of Veterinary Medicine in Central Luzon State University (CLSU)- Best Paper for Completed Research (Undergraduate Thesis)
- b. "Development of a Sustainable Village-Based Artificial Insemination System: The VBAIT Approach" of PCC at Mariano Marcos State University and the "Development of Animal Health and Management Protocol for Grazing Buffaloes: Improving Reproductive Performance in Dairy Buffaloes through Uterine Betadine Flushing and Use of Teaser Bull" of PCC at Ubay Stock Farm - Best Papers for Completed Research (PCC researches).

After the review, the agency also hosted the 2nd Lecture Series of the Philippine Society of Animal Science (PSAS) in honor of Dr. Art Calud with the theme "The Philippine Swine Industry: The Challenges We Face Today". The lecture series was participated in by various individuals and researchers from different universities, government institutions, and private sector.



Conference Presentations and Journal Publications

The PCC's researchers have actively participated in local and international scientific conferences as paper and/or poster presenters. Likewise, research articles were submitted to various local and international journals. In 2012, seven papers were published in refereed journals while eight were included in scientific proceedings (*Appendix 2*). An additional six papers were already proofread while another six are still being reviewed.

Technical Seminars and ARBS-PSAS Convention

The PCC has conducted a series of Technical Seminars on various topics related to animal health, animal nutrition, rumen biotechnology and advanced techniques on reproductive biotechnology (Table 5).

Table 5 Technical seminars conducted in CY 2012

Date (2012)	Topic Presented	Topic Presented
February 23	Field Survey and Experiment on Milk Productivity of Buffaloes in Chitwan, Nepal	Field Survey and Experiment on Milk Productivity of Buffaloes in Chitwan, Nepal
March 14	Mycobacterial Infection at Human and Animal Interface	Mycobacterial Infection at Human and Animal Interface
August 16	Advance Research, Socio-Cultural Experiences and More: A Sharing on the US-Phil. Fulbright Program	Advance Research, Socio-Cultural Experiences and More: A Sharing on the US-Phil. Fulbright Program
November 23	Dynamics and Functionalities of Animal Intestinal Microflora explored with Molecular Approaches	Dynamics and Functionalities of Animal Intestinal Microflora explored with Molecular Approaches

The PCC also supported and co-sponsored the joint scientific conferences of the Asian Reproductive Biotechnology Society (ARBS) and the Philippine Society of Animals Science (PSAS) on October 23-28, 2012 at the EDSA Shangri-La, Ortigas Center, Mandaluyong City.



PCC Executive Director Dr. Libertado Cruz addresses the participants of the ARBS conference and PSAS convention

Awards and Recognitions

Two PCC personnel received standing awards from the Philippine Society of Animal Science (PSAS) during its 49th Annual Scientific Conference on October 23-25, 2012 held in EDSA Shangri-La, Ortigas, Mandaluyong City. They were as follow:

- Dr. Annabelle S. Sarabia (Chief of PCC's Operations Unit) - 2012 PSAS Distinguished Fellow
- Dr. Claro N. Mingala (Scientist 1 of PCC's Animal Health Unit) – 2012 PSAS Distinguished Researcher in Veterinary Medicine

Awards were also given to various PCC researchers for their papers or posters as presented in different scientific conferences (Table 6).

Table 6 Awards received by PCC researches for their paper or poster presentations

	Title	Authors	Title of Scientific Conference/Symposium
1. Best Poster	Performance of Frozen-thawed Water Buffalo Spermatozoa on Varying Time & Temperature Under Hypo-osmotic Swelling test	D.H. Duran, R.P. Mallari, E.R. Maylem, D.J.P. Suba, P.G. Duran, E.A. Abella, and L.C. Cruz	9th Annual Conference of the Asian Reproductive Biotechnology Society
2. 1st Place - Applied Research	Optimized Extenders for the Cryopreservation of Goat Semen for Artificial Insemination	M.A.G. Beltran, E.P. Atabay, E.C. Atabay, F.P. Aquino, E.M. Cruz and L.C. Cruz	49th Annual Scientific Conference of the Philippine Society of Animal Science
3. Best Paper (Thesis Dissertation)	Gross Morphology and Histology of the Uterine Tubes of Matured Philippine Water Buffalo	V.D. Viernes, Jr., and F.V. Mamuad	24th CLSU In-house Review of Completed and Ongoing R&D Projects
4. 2nd Place - Development Category	S&T-Based Farm Project on Improving the Productivity of Dairy Buffaloes through Flushing and the Use of Milk Replacer	D.L. Aquino, W.T. Del Rosario, L. S. Verona, M.M. Delizo, and A.S. Sarabia	23rd CLARRDEC Regional Symposium on Research and Development Highlights
5. 3rd Place - Research Category	Concordance of Competitive ELISA and Nested Polymerase Chain Reaction in the Detection of Caprine Arthritis-Encephalitis Virus	J.C. Vinson Gonzales, C. Y.J. Domingo, N.S. Abes, C.A. Gutierrez, M.A. Villanueva, and C.N. Mingala	23rd CLARRDEC Regional Symposium on Research and Development Highlights
6. Finalist for the Applied Research Category	Buffalo DNA Markers Associated with Milk Yield and Milk Component Traits and their Implications to the PCC's Dairy Buffalo Breeding Program	J.R.V. Herrera, L.C.Cruz, E.B. Flores, J.F. Maramba, and A.S. Villanueva	24th National Research Symposium, DA-Bureau of Agricultural Research

Newly Approved Externally Funded R&D Projects

In 2012, the Philippine Council for Agriculture, Aquatic, Natural Resources Research and Development (PCAARRD) has granted PCC a total of eight new projects under three umbrella R&D programs, which are scheduled for implementation in 2013 (Appendix 3). The PCC and partner-agencies have earmarked counterpart budgets for the purpose.

KNOWLEDGE resource management

Recent events in the carabao industry, including scientific collaborations and other related undertakings, were made known to the public thru sustained efforts on information dissemination.

Knowledge Resource Management

Production and Distribution of Information, Education, and Communication (IEC) Materials

Recent events in the carabao industry, including scientific collaborations and other related undertakings, were made known to the public thru sustained efforts on information dissemination. These materials were popularized and packaged by the Applied Communication Section (ACS) of the Knowledge Resource Management Division.

Four issues of the PCC Newsletter were released in 2012. The other regular publications that were circulated to the general public were two issues of the PCC Balita and one issue of the R&D Highlights. Eight other IEC materials were produced, such as: updated corporate primer, PCC Publications' Catalogue, coffee-table book on carabao festivals, technology poster on artificial insemination (AI), AI service recipient booklet, AI flyer, 9th Asian Reproductive Biotechnology Society congress proceedings and souvenir program.

A total of 384,434 copies of these IEC materials were distributed to PCC stakeholders, visitors, and partner institutions, among others.

Utilizing Other Media Forms

The PCC regularly placed an ad material in occasions organized by its partner-agencies and cooperators in the industry. It has published 10 advertisements in print and dispatched and monitored 85 press releases in print and online.

These efforts were complemented with participation in 22 exhibits and industry-related events that served as venues where PCC and its programs were promoted.

The ACS also strengthened its initiative on establishing better media mileage for the agency thru 13 television and radio interviews and guestings that were recorded this year. Two of the biggest TV networks, ABS-CBN and GMA7, have frequented coverage of the various activities of PCC including primetime segments that featured PCC's dairy products.

The PCC's official website with URL www.pcc.gov.ph also served as a hub of all information related to the Carabao Development Program. It gave the agency's clients, interested individuals, and institutions an easy access to the digital copies of all PCC's IEC materials for printing or downloading. News updates about the agency were also regularly uploaded in the website.

Prioritizing Customers' Satisfaction

A total of 5,714 visitors were received, oriented, and toured to the PCC facilities in 2012 following the standards of the Integrated Management Systems. A majority of the visitors were students and farmers. The others were either government officials or employees and researchers.

With the purpose of continually improving its systems in receiving visitors, the ACS conducts a Visitors' Satisfaction Survey quarterly. In 2012, the Visitors' Bureau, which is composed of the ACS staff members and security guards, recorded a satisfaction rating of 4.77 (very good to excellent), which is above the agency's Quality Management Systems (QMS) target rating of 4.25 percent.



GMA 7's Unang Hirit segment host Toni Pet waits for his cue during an outdoor shoot at the PCC National Gene Pool



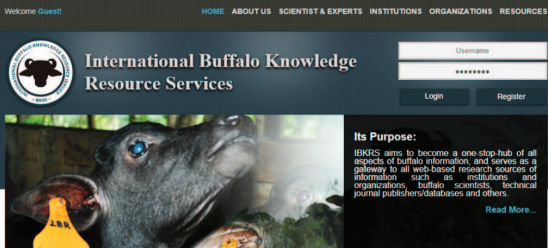
Farmer-partners of PCC get the latest updates about the agency thru various information, education, and communication (IEC) materials such as the PCC Balita produced by the ACS team semi-annually



Scientific Library Services

The agency's Knowledge Resources Management Center (KRMC) or scientific library has strengthened continuously its collection of references in the fields of Livestock, Livestock Biotechnology, Cryopreservation, Genomics, Animal Health and Nutrition, Reproductive Biotechnology, and Bioinformatics. As of December 2012, it had a total collection of 3,125 bibliographic entries of books, e-books, journals, thesis, and multimedia, which are stored on its web-based Electronic Integrated Library System (EILS). It also had linkages with four external journal databases that can be accessed through Online Public Access Catalog (OPAC) for ease of locating and retrieving the needed library materials.

The KRMC has also continued managing and maintaining the database of the International Buffalo Knowledge Resource Service (IBKRS), a web-based hub which consolidates all buffalo-related researches as published in refereed international journals in the past five years. To date, the IBKRS has a total of 8,553 e-journal articles in full-text and abstracts, which can be accessed via URL www.ibkrs.net.



Information and Communication Technologies

The PCC through its Information and Communication Technologies Section (ICTS) enhanced, upgraded and installed 18 new Central Processing Unit (CPU) from Pentium 4 to Core 2 Duo to its various Operating Units in June 29, 2012. The upgrading ensured that the workstations were up-to-date and high-end. Maintenance and patch upgrading of Windows Server Enterprise 2008R2 edition Operating System, and Microsoft Forefront Threat Management Gateway 2010 were also conducted to make a secured web gateway that provides comprehensive protection against web-based threats and allows users to safely and productively use the internet for research without worrying about malware and other threats.



Complementing its major activities, regular maintenance, troubleshooting and upgrading of Windows 7 32 bit and 64 bit Operating System, as well as regular upgrading of Microsoft Office 2010 patches were also done.

Consistently following a support system to ensure a virus-free local area network (LAN), the ICTS likewise renewed its Symantec Endpoint Protection Anti-Virus. This ensures protection to all units joined in the LAN from any fortuitous computer bug infection.

Geographic Information System (GIS)-based maps were likewise generated particularly zooming in on variables such as Carabao Population and Density, AI technicians, bulls distributed, dairy cooperatives in the provincial and municipal level. This is used by the top management as a tool for decision-making.

The ICTS likewise enhanced and maintained existing Information System of the Electronic National Government Accounting System (e-NGAS), Document Tracking System, and Records Management Information System. In cooperation with the ACS, the ICTS ensured regular updating of contents in the PCC website to include timely uploading of news articles about PCC.

IT equipment procured under the KOICA-assisted project entitled "Enhancing the Livestock Sector Performance in the Philippines" which empowers PCC's program on Genetic and Dairy Herd Improvement System included 14 units Desktop (Core i3), 5 units Laptop (Core i5), 2 units Server, MS SQL Server 2008, MS ISA Forefront TMG and MS Visual Studio 2010.

INSTITUTIONAL development

Institutional Development

Livestock Biotechnology Roadmap

In keeping with its designation as the lead agency for livestock biotechnology, the PCC has spearheaded the conduct of multi-stakeholders planning workshop (utilizing Open Space Methodology) on May 10-11, 2012 at the SEAMEO-INNOTECH in Quezon City for the formulation or crafting of the Livestock Biotechnology Roadmap. Initially, the workshop participants, which involved key representatives from the PCC, NDA, BAI, LDC, PCAARRD, DOST, UPLB Biotech, and private individuals representing the beef cattle, swine, and small ruminants sectors, identified relevant issues and broad directions to address the perceived needs of the livestock industry, which biotechnology could address over a period of 30 years. The workshop output served as an important component of the Livestock Biotechnology Road Map manuscript that was eventually drafted by Mr. Pete Ocampo (retired UPLB professor and former executive director of LDC). The major components of the Road Map include Information, Education, and Communication, Policy Advocacy, Research and Development, and Institutional Development. The Road Map is scheduled for presentation to the DA Management in 2013.

Institutional Linkages

Recognizing the value of social capital in pursuing its mandate and in strengthening its capability as a research agency, the PCC has established new linkages and maintained existing partnerships with various institutions for purposes of R&D, technical cooperation, and capability building (Table 7).

The major components of the Road Map include Information, Education, and Communication, Policy Advocacy, Research and Development, and Institutional Development.



Table 7 List of partner-institutions, CY 2012

Partner Institution	Nature of Linkage
Laboratory of Infectious Diseases, School of Veterinary Medicine, Hokkaido University, Japan	R&D and Technical Cooperation
Hokkaido University Research Center for Zoonosis Control, Japan	R&D and Technical Cooperation
Consortium for Japanese Veterinary Medicinal Products Manufacturers, Japan	R&D
Korea International Cooperation Agency	Technical Cooperation
Sunchon National University, South Korea	Capability Building
Hankyong National University, South Korea	Capability Building
Korea Institute for Animal Products Quality Evaluation, South Korea	R&D and Technical Cooperation
Japan International Cooperation Agency, Japan	Capability Building
Rajamangala University of Technology Thanyaburi, Thailand	Technical Cooperation
Colorado State University, USA	Capability Building
Department of Veterinary and Animal Science, University of Massachusetts, USA	Capability Building
University of Wisconsin, USA	Capability Building
Manila Economic and Cultural Office-Taiwan Economic and Cultural Office	Technical Cooperation
Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development- Department of Science and Technology	R&D
National Academy of Science and Technology	R&D
Research Institute for Tropical Medicine-Department of Health	R&D
Central Luzon State University-College of Veterinary Science and Medicine	R&D
Central Luzon State University-Small Ruminants Center	R&D
Molecular Protozoology Laboratory, Natural Sciences Research Institute, University of the Philippines Diliman	R&D
National Institute of Molecular Biology and Biotechnology, University of the Philippines Diliman	R&D
Bureau of Animal Industry	R&D
Bureau of Agricultural Research	R&D
Department of Agriculture Biotech Program	R&D
Department of Agriculture-National Agricultural and Fishery Council	R&D
Accredited Swine Breeders Association of the Philippines	R&D
Livestock Development Council	R&D
Public Law (PL) 480	R&D and Capability Building
Kennedy Round (KR) 2	Development

Likewise, the PCC has sustained its partnerships with state colleges and universities (SUCs) that host its regional centers and with the local government units (provincial and municipal/city levels), farmer-cooperatives, and private entities across the country for the implementation of various activities under the Carabao Development Program.

Integrated Management Audit System

Early in the year, the PCC National Headquarters and Gene Pool was re-certified to ISO 9001:2008 (Quality Management System or QMS). Confirmation of its qualification for certification was made after a thorough evaluation of its processes and after it was established that these are in conformance with the requirements of the International Standards.

The PCC National Headquarters has been certified to ISO 9001 since January 2003 after the top management committed to create only quality products and render quality services to its clients. Since then, the same commitment has become every personnel's pledge, thus maintaining the implementation of an established QMS.

Efforts were also exerted to establish Environmental Management System (EMS) to ensure that no harm to environment is caused by the activities related to the agency's product creation. The efforts resulted in the PCC National Headquarters and Gene Pool's certification to ISO 14001.

While endeavor is on to protect the environment, the welfare of PCC's personnel was also put into prime consideration. Along with the establishment of EMS, Occupational Health and Safety Management System (OHSMS) was also put in place. This was followed by testing and rigid assessment of the established system which eventually resulted in the certification to OHSAS 18001.

Maintenance of IMS Certification. Upon certification, sustained implementation of the system was ensured by conducting the following activities:

1. **Internal Audits** which were done in three (3) batches to cover all areas at the National Headquarters and Gene Pool. Audit areas remarkably increased after the integration of EMS and OHSAS. This increase was brought upon by the creation of necessary committees and designations, e.g., Health and Safety Committee; Emergency Preparedness and Response including Fire Brigade; Waste Management; and Pollution Control and Safety Officer. Audit of the Staff Housing has also been included to ensure that no harmful pollutants are released to the environment.
2. **Coaching/Mentoring** to increase the level of awareness and generate cooperation from the different areas was also carried out. Focus was given to the personnel of Gene Pool; GSU; Laboratories; and Dairy Processing Plant where processes are more complex and where potential health and safety hazards and environmental aspects and impacts are present.
3. **Trainings/Seminars/Drills** on the following were also carried out:
 - a. Basic Life Support (BLS) and First Aid administration for 21 employees representing different work areas. Certificates and identification were granted by the Philippine Red Cross (PRC) to these personnel, authorizing them to administer first aid treatment in emergency cases.

The PCC National Headquarters and Gene Pool gained the title of an IMS (Integrated Management System) certified agency.



- b. Fire, Earthquake Safety Awareness Seminar, and Chemical Spill Drills for all the employees in collaboration with the local Bureau of Fire Protection (BFP) were conducted twice.
 - c. Training on Internal Audit for Integrated Management System was also conducted for 22 employees who were eventually designated as members of the Internal Audit Team.
 - d. Two (2) sessions of group reviews by internal auditors were likewise carried out for a better internalization of IMS requirements and criteria.
4. **Establishment and Maintenance of Fire Fighting Equipment** through the purchase of fire extinguishers and periodic checking of other firefighting equipment, e.g., hydrants, fire hoses, and sprinklers.
 5. **Preventive Maintenance and Calibration** of laboratory and plant equipment was another important activity that was conducted to ensure accuracy of results and product quality.
 6. **Monitoring of Compliance to Legal and Other Requirements** is continuously being done to ensure that necessary controls in place that will result to better productivity. This includes having the key personnel undergo annual physical examination and medical consultation.

QMS Certification of PCC Regional Centers

Assistance in documenting the QMS of four centers was done in 2012. The efforts resulted in the eventual certification to ISO 9001:2008 of two centers, namely, PCC at UPLB and PCC at USF. Two more centers are currently on the process of refining their documented processes and aim to get certified in 2013.

Assistance in the maintenance of QMS certification by PCC at MMSU was also conducted.



PCC at UPLB (top) and PCC at USF (bottom) receive their QMS certification from TUV SUD PSB Philippines

Resources Management

Human Resources

In response to the agency's expanded mandate as the lead agency in livestock biotechnology and consistent with its policy for an effective and efficient delivery of quality products and services, the agency strengthened its recruitment, selection, and staffing processes.

As part of the abovementioned HR system check, the agency revitalized the procedures in hiring staff specifically on job order or contractual employees. Consistent with the IMS policy, the said process has been registered on October 3, 2012 and took effect on October 9, 2012.

For 2012, the Personnel Unit attended to around 50 applicants of various fields of specialization and pooled 27 of them to serve as a potential source of manpower when the need arises.

As of December 2012, the agency has a total workforce of 441 personnel (including job order) (Table 8).

Table 8 Distribution of PCC Plantilla Personnel, CY 2012

Office/Center	Technical Staff	Non-Technical Support Staff	Administrative Staff	Total
Office of the Executive Director	22	11	17	50
PCC at CLSU	30		2	32
PCC at UPLB	24		2	26
PCC at CSU	13		1	14
PCC at MMSU	8		1	9
PCC at DMMMSU	7		1	8
PCC at USF	13		1	14
PCC at VSU	8		2	10
PCC at WVSU	8		1	9
PCC at LCSF	11		1	12
PCC at CMU	11		4	15
PCC at USM	10		1	11
PCC at MSU	10		1	11
PCC at MLPC	11		1	12
Total	186	11	36	233



In response to the agency's expanded mandate as the lead agency in livestock biotechnology and consistent with its policy for an effective and efficient delivery of quality products and services, the agency strengthened its recruitment, selection, and staffing processes.

Training and Development. Trainings participated in by PCC personnel for 2012 were based on the critical competency gaps as identified in the previously conducted training needs assessment of the agency wherein it developed a three-year training plan (2012-2014). Catch-up plan for scheduled staff training per unit was made in the last quarter of 2012.

Appendix 4 summarizes the conferences, seminars, symposia, and trainings participated in by the PCC personnel in 2012.

Two personnel were also granted a scholarship by the agency in pursuing graduate degree programs. One of which (Dr. Ester Flores) is on her second year of PhD program in Animal Breeding and Genetics at the University of New England in Armidale, New South Wales, Australia while the other (Mr. Jeffrey Jerome Balaoing) has just started his MS program in Service Management Engineering at St. Louis University in Baguio City.

Orientation, coaching, and focus group discussions were conducted in the various PCC-OED units and Regional Centers to improve the adoption of the new Performance Evaluation System (PES) of the Civil Service Commission.

Performance Evaluation System. Orientation, coaching, and focus group discussions were conducted in the various PCC-OED units and Regional Centers to improve the adoption of the new Performance Evaluation System (PES) of the Civil Service Commission. Semi-annual PES was administered to both permanent and contractual employees.

Performance Standards for Scientists or Researchers of PCC were also crafted, which was basically adopted from the standards of the Scientific Career System. The said standards shall serve as a basis for setting appropriate targets and for evaluating the accomplishments of the agency's researchers.

Review of Human Resource Management (HRM) System. The agency's HRM System, originally crafted by a consultant in 2011, was reviewed vis-à-vis existing processes, policies, and procedures. Competency and gap analysis with the aid of training needs assessment (TNA) was also conducted to appropriately design and identify critical intervention in terms of trainings, degree programs, manpower planning, succession planning, and career pathing for 2012 to 2014.



Budget and Finance

The agency has improved its compliance to all mandatory financial accountability reports as prescribed by regulating and coordinating agencies such as the Commission on Audit, Department of Budget and Management, and the Department of Agriculture. Budgetary requirements of the operating units of the center were provided on time and in accordance with the approved plans. Processing lead time on the provision of logistical requirements (e.g., supplies, payment of utilities) at the central office was also improved from an average of ten working days to seven working days for regular transactions. Suspension and disallowance of financial transactions were also decreased by 80% as compared to 2011 results of operation.

A more dynamic and synchronized budgeting process was also institutionalized in 2012, particularly among the operating units of the central office. A more responsive process flow was likewise adopted to address activities that were not included in the approved work plans. Coordination among units involved in the process flow of property accountability and procurement was strengthened and appropriate process flow to institute regular coordination was also revised and implemented. This resulted in an increased number of dropped property accountabilities at the National Impact Zone, Gene Pool, and Lomboy (quarantine) areas. There is also an aggressive housekeeping of records and properties.

Likewise, appropriate administrative policies, procedures, and processes were issued and implemented to enhance transparency of operation and minimize lead time in processing financial claims and administrative services.

Sources and Usage of Funds. The agency's main sources of funds to support its operation were provided by the national government through the General Appropriations Act (GAA). Table 9 presents the details of utilization.

Table 9 PCC Sources and Utilization of Funds as of December 31, 2012
(Php Million), cumulative balances

Fund Source	Usage
GAA-Current & Continuing	721.38
Personnel Services	81.32
Maintenance & Other Operating Expenses	189.53
Capital Outlay	450.53
Agri-Pinoy Livestock - Current & Continuing	40.23
Maintenance & Other Operating Expenses	22.72
Capital Outlay	17.51
Revolving Fund- Dairy Business Module	35.21
Special Projects Fund	39.62
Total	836.44



A more dynamic and synchronized budgeting process was also institutionalized in 2012, particularly among the operating units of the central office.

Special projects fund refers to research funds from various government agencies and institutions. Utilization of which was mainly on the maintenance and operating requirements of the project.

Financial Condition. Table 10 presents the PCC's Statement of Financial Condition at the end of FY 2012. The agency's total assets as of December 31, 2012 amounted to Php2,209.55 million comprising mainly of the agency's Property, Plant, & Equipment (PPE) and Breeding Stocks or Other Assets. The significant change in the current assets represents the increase in prepayments for the deposit on letter of credits for the requirements of the planned importation of dairy buffaloes. Total liabilities posted Php584.82 million and total equity reached Php1,624.74 million. Significant increase in equity is attributed to the investment of the government for the infusion of dairy buffaloes.

Table 10 Statement of Financial Condition as of December 31 (Php Million)

Particulars	FY 2012	FY 2011	% Change
Assets			
Current Assets	868.92	352.26	147
Property, Plant, and Equipment	798.69	711.51	12
Other Assets (Breeding Stocks)	541.95	541.31	0
Total Assets	2,209.55	1,605.08	38
Liabilities	584.82	588.82	-1
Government Equity	1,624.74	1,016.26	60
Total Liabilities and Government Equity	2,209.55	1,605.08	38

The PCC's total income for the year reached Php962.71 million, which comprised mainly of the subsidy from the national government. The business income represents the sales of milk, meat, live animals, and other by-products as a consequence of the operation of the institutional dairy business module at the regional centers. Other income has increased significantly due to the receipt of donated technical and scientific equipment from the Republic of Korea through the Korea International Cooperation Agency (KOICA) in support of the project on "Enhancing Livestock Sector Performance in the Philippines".

Personnel services expenses posted Php81.50 million, while total maintenance and other operating expenses including non-cash expenses for the depreciation amounted to Php371.70 million giving a net income or surplus from operation of Php591.01 million. The significant increase in the net income for FY 2012 is attributed to the increase in subsidy from the national government.

APPENDIX 1a LIST OF COMPLETED RESEARCHES

Research Area	Title	Researchers
Animal Health	1. Evaluation of Two DNA Extracting Methods for Sensitive Detection of Mycobacterium bovis in Spiked Milk Using Polymerase Chain Reaction Assay	M.A. Villanueva and C. N. Mingala
	2. RT-PCR and RT-LAMP detection kits for Rapid Screening of FMD Virus infection	R.C. Paraguison, E.B. Flores, and L.C. Cruz
	3. Genotyping and Molecular Characterization of NRAMP1/-2 Genes as Location of markers for Resistance and/or Susceptibility to Mycobacterium bovis In Swamp and Riverine Water Buffaloes	C.N. Mingala, N. S Abes, and L.C. Cruz
	Undergraduate Thesis	
	4. Molecular Detection and Classification of a Theileria Species in Cattle in the Philippines	L. P. Belotindos, J.V. Lazaro
	5. Detection of Enzootic Bovine Leukosis in Cattle Using Nested-Polymerase Chain Reaction Assay	M.A. Villanueva, C.N. Mingala J. A. Uera, DVM1, J. V. Lazaro, and C. N. Mingala
	6. Intramammary Teat Sealant as Preventive management for Subclinical Mastitis in Water Buffaloes (Bubalus bubalis)	Myra B. Villamor, Noraine P. Medina, Claro Mingala
	7. Detection of Caprine Arthritis encephalitis Virus from Goats Using Competitive and nested Polymerase Chain Reaction	J.C. Vinson Gonzales, C. Y J. Domingo, N.S . Abes, C.A. Gutierrez, M. A. Villanueva, and C.N. Mingala
8. Correlation of California Mastitis and Somatic Cell Count on Milk of Murrah Buffaloes	A.A. Garcia, R.T. Salvador and N.S. Abes	
Animal Nutrition	1. Augmented Feeding with By-Passed Amino Acids and Slow Release Non-Protein Nitrogen (NPN) Supplement in Dairy Buffaloes	D.L. Aquino, P.G. Duran, and M.V. Del Rosario
	2. Development and testing of Total Mixed Ration (TMR) for Growing Buffaloes	R.T. Salas, M.B. Wandagan, and F.T. Rellin
	3. Effects of the Inclusion of Thyroprotein in the Diet of Dairy Buffaloes on Milk Yield from 80-100 Days of Lactation	R. R. Piñera, et al.
	4. Milk Production Performance Evaluation of BMB Milking Herd of PCC at CMU	L.C. Paraguas, A.G. Racho, M.R. Renacia
Anatomy and Physiology	Dissertation	
	1. Ultrasonographic Features of the Spleen, Liver, Kidney and Udder of Buffaloes at Different Stages of Lactation	J.L Constante, J.A. Acorda, and A.N. Del Barrio
	2. Scanning Electron Microscopy of the Uterine Tubes of Matured Philippine Water Buffalo	V. Viernes and F.V. Mamuad
Molecular Genetics and Breeding	1. Characterization of the Swamp and Riverine Buffalo Genome: Single Nucleotide Polymorphism (SNP) Detection in Buffaloes Associated with Milk and Milk Component Traits	J.R.V. Herrera, L.A.M Del Barrio, T. Fernando, E.B. Flores, and L.C. Cruz
	2. Use of DNA Fingerprinting and other Molecular Markers in Genetic Resource Conservation and Improvement of Water Buffaloes: Parentage Verification of Riverine and Swamp Buffaloes Using Microsatellite Markers	J.R.V. Herrera, A.S. Villanueva, J.F. Maramba, E.B. Flores, and L.C. Cruz
Reproductive Biotechnology	Undergraduate thesis	
	1. Effect of Cysteamine on Oocyte In-vitro Maturation and Developmental Competence of Pre-Implantation Embryos In Goats (Capra hircus)	G. P. M. Lazaro, L. M. Rigos, and E. C. Atabay

Product Development	<p>Undergraduate thesis</p> <ol style="list-style-type: none"> 1. Nutrient Content and Sensory Quality of Lactose-Free Buffalo's Milk Produced by Either Commercial Lactase Treatment or Inoculation with <i>Aspergillus oryzae</i> 2. Nutrient content, Sensory quality, and Consumer's acceptability of full - fat and low - fat feta cheese made from buffalo's milk packed in canola oil and basil 3. Functional, Chemical and Sensory Qualities of Mozzarella Cheese with Different Combinations of Buffalo's Milk and 12% Reconstituted Skim Milk 4. Nutritive Value and Acceptability of Cream Cheese from Pure Buffalo's Milk Herbed with Malunggay (<i>Moringa oleifera</i> L.) 	<p>L.B. Rosal, M.C.R. Oliveros, and R.M. Lapitan</p> <p>M.F.D. Falconi, M.C. R. Oliveros, and R.M. Lapitan</p> <p>J.L. Lamano, M.C. R. Oliveros, and R.M. Lapitan</p> <p>O.S. Apilado, M.C. R. Oliveros, and R.M. Lapitan</p>
Social Research/Socio-Economics	<ol style="list-style-type: none"> 1. Development of a Sustainable Village-Based Artificial Insemination System: The VBAIT Approach 2. An Analysis of the Artificial Insemination Program for Water Buffalos in the Philippines: A Case Study in Nueva Ecija <p>Dissertation</p> <ol style="list-style-type: none"> 3. Innovation in the Traditional Community-based Carabao Dairy Industry 	<p>G.M.R. Recta, W.A. Gudoy, L.G. Battad, A.S. Sarabia, and M.M. Alimbuyuguen</p> <p>E.P. Palacpac, M.G. Honorio, and E. Valiente</p> <p>M.M.S. Recto and F.V. Mamuad</p>
Forage Production	<ol style="list-style-type: none"> 1. The Influence of Vermicast on the Growth, Yield and Nutrient Composition of Selected Forages (Ruzi grass and Forage peanut) 	<p>E.U. Corpuz, Jr., B.J.C. Basilio, and D.E. Corpuz</p>
Reproduction	<ol style="list-style-type: none"> 1. Effect of Uterine Povidine-Iodine Solution Flushing on Artificial Insemination Success Rate for Grazing Dairy Buffaloes 	<p>C.B. Salces, G.P. Bajenting, A. Casinillo and K. Ciroy</p>

APPENDIX 1b LIST OF ONGOING RESEARCHES

Research Area	Title	Researchers
Animal Health	1. Bovine Vaccine Trial of Schistosoma japonicum Paramyosin	M.A. SL. Jiz, and C.N. Mingala
	2. Development of LAMP Assay and Quick Test Kit for Viral Gastro Intestinal Infection (PED and TGE) of Swine	R.P. Alili, R.S. Gundran, and C.Y.J. Domingo
	Undergraduate Student thesis	
	3. Loop Mediated Isothermal Amplification(LAMP) Detection of Caprine Arthritis-Encephalitis Virus in Milk	R.M. Dela Cruz, C.Y.J. Domingo, and C.N. Mingala
	4. Synovial Fluid Subjected to Single Polymerase Chain Reaction Using F3, B3 from CAE LAMP Primers and Nested Polymerase Chain reaction for Detecting Caprine Arthritis Encephalitis	J.N. B. Austria, M.T. T. Oriente, C.Y.J. Domingo, and C.N. Mingala
	5. Raw, Boiled and DNA Extracted Synovial Fluid Subjected to Loop-Mediated Isothermal Amplification for Caprine Arthritis Encephalitis Virus Detection	K.D.J. Beronio, C.Y.J. Domingo, and C.N. Mingala
	6. Detection of Respiratory Bacterial Pathogens in Large and Small Ruminants	H. Bautista, R.B. Reyes, G. Ordonez, G.G. Garcia, and C.N. Mingala
	7. Evaluation of Treatment Alternatives against Respiratory Bacterial Pathogens of Small and Large Ruminants	R.A. del Pillar, G.V.M. Marcelo, J.G. Tolentino, G.G. Garcia, and C.N. Mingala
8. An Epidemiological Survey of Fasciolosis in Water Buffaloes at Philippine Carabao Center-National Impact Zone (PCC-NIZ) Assisted Dairy Cooperatives in Nueva Ecija	A.R. Nipal, S.L. Alvarez, V.V. Vloria, and C.N. Mingala	
Animal Nutrition	1. Comparative Performance of Nursing Buffalo Calves Fed with Pure Milk, Cattle Milk and Milk Replacer	D.L. Aquino, P.G. Duran, and M.V. Del Rosario
	2. Improving the Degradability of Rice Straw Using Tropical Edible Fungal Species	R. Cabanting and D.L. Aquino
	3. Development of Buffalo Feeding Regimes from Enhanced Sweet Sorghum Biomass of Bio-ethanol Production	P.C. Florendo, N. P. Garcia, M.P. Abella, M. Roguel, and F.V. Mamuad
	4. Identification of the Novel Rumen Microbes Associated with Hydrolysis Pre-treatment of Alternative Feedstock	P.C. Florendo, F.G. Mamuad, and S.P. Bangit
Reproductive Biotechnology	1. Optimizing Culture Condition for the In Vitro Development of IVF and Nuclear Transfer-Derived Buffalo Embryos: The Effect of Gas Environment, Culture Medium and Embryo Density During Culture	E.C. Atabay, E.P. Atabay, F.P. Aquino, R.V. de Vera, and L.C. Cruz
	2. Cryostorage of vitrified Immature Bovine And/Or Bubaline Oocytes Using the Cryoloop Device	L.C. Ocampo, F.P. Aquino, E.P. Atabay, P.B. Pedro, M.B. Ocampo, and L.C. Cruz
	3. Vitrification of Buffalo Oocytes by Minimum Drop Size Technique	M.B. Ocampo, L.C. Ocampo, P.B. Pedro, E.P. Atabay, F.P. Aquino, and P.G. Duran
	4. In Vitro Fertilization By Intracytoplasmic Sperm Injection (ICSI) in Buffaloes	P.B. Pedro, E.C. Atabay, E.P. Atabay, L.C. Ocampo, and L.C. Cruz
	5. Synchronizing Ovulation Using OVSYNCH-CIDAR-Based Protocol for Fixed Time Embryo Transfer (FTET) in Water Buffaloes	P.G. Duran, E.P. Atabay, P.B. Pedro, D.H. Duran, E.C. Atabay, F.P. Aquino, E.B. Flores, and L.C. Cruz
	6. Enhancing Cryoviability of In-Vivo Derived Goat Embryos by Optimizing Embryonic Stage and In-Vitro Culture of Morula to Blastocyst Before Freezing	E.P. Atabay, E.B. Flores, and E.C. Atabay
	7. Viability of Goat Embryos Maintained in Portable Incubator During Transit for Embryo Transfer	F.P. Aquino, E.P. Atabay, and E.B. Flores

Molecular Genetics and Breeding	<ol style="list-style-type: none"> 1. PCC Breeding Program for Philippine Dairy Buffaloes: Genetic Evaluation and Breeding Value estimation in Philippine Dairy Buffaloes for Milk Yield Traits Using Milk Test Day Records 2. Development of Molecular Markers as Potential for Use in Breeding Program of Local Livestock Species in the Philippines: Screening for Genetic Disease-associated DNA Polymorphism in Water Buffaloes 3. Genetic Improvement Program of Swamp Buffaloes 	<p>E.B. Flores and J.F. Maramba</p> <p>R.C. Paragonson, R.G. Cacho, L.M. Labonite, E.B. Flores, J.R.V. Herrera, and L.C. Cruz</p> <p>F.T. Rellin, E.B. Flores, R. Piñera, and L.C. Cruz</p>
Social Research / Socio-Economics	<ol style="list-style-type: none"> 1. Determinants of Sustainability on the Effectiveness and Efficiency of the Artificial Insemination Services in the Implementation of the Carabao-based Enterprise Development at the National Impact Zone 2. Understanding the Population Dynamics of Bulgarian Buffaloes Entrusted to the Farmers' Cooperatives in the National impact Zone 3. Impact Assessment of the Carabao Development Program of the Philippine Carabao Center –Commissioned Research, CLSU Team 4. "To Milk or Not to Milk": Understanding the Practices and Behavioral Intentions of Crossbred Buffalo Owners in San Agustin, Isabela 5. Profitability Assessment of PCC-USF Institutional Dairy Processing and Marketing Center 6. Assessment of Performances of the Buffalo Bulls Under the Bull Loan Program in Central Visayas <p>Undergraduate Thesis</p> <ol style="list-style-type: none"> 7. Effects of Computer Games on Elementary School Children's Fresh Buffalo Milk Intake 	<p>M.U. Aquino, E. Paoay, and E. Valiente</p> <p>E.P. Palacpac, E.Valiente, M.G. Honorio, R. Jacang</p> <p>M.E. M. Orden, F.L. Porciuncula, E.A. Orden, I.J. Domingo, P.J. Rafael, Jr., and N.Zapata, Jr.</p> <p>E.P. Palacpac, F.T. Rellin, H.M. Baltazar, A.S. Sarabia, E.Valiente, M.G. Honorio, E. Valiente, and R. Jacang</p> <p>C.B. Salces, G. Abay-abay and C. Maturan</p> <p>B.A. Hingpit, J.A. Bigcas and A.A. Anooos</p> <p>I.K.P. Gahoy et al.</p>
Product Development	<ol style="list-style-type: none"> 1. Development of Chilled Coffee Flavored Buffalo Milk-Based Drink 	<p>L.M. Parungao, T.L. Canaria, and R.M. Lapitan</p>
Forage Production	<ol style="list-style-type: none"> 1. Performance of Grass Legume Pasture Fed to Dairy Buffaloes under Cooperative Management System 2. The use of Day in- Day out in assessing the Pasture Quality and the Performance of Grazing Buffaloes under PCC-CSU Condition 3. Establishment of Brachiaria humidicola as feed source and a biological control of obnoxious weeds in native pasture 4. Establishment of Ipil- ipil (Leucaena leucocephala) K636 as cut-and-carry pasture under different spatial arrangement 	<p>M.B Wandagan, R.B Carag, L. Agumboy</p> <p>M.B. Wandagan and R. Marcos</p> <p>W.B. Wandagan and J.Lucob</p> <p>W.B. Wandagan and A.Tarun</p>
Reducing Calf Mortality	<ol style="list-style-type: none"> 1. Reducing Calf Mortality at PCC-MMSU through Improved Health and Management Schemes 	<p>C.P. Dabalos, F.T. Malicad, R. Sair, J. Donato, and A. Padulip</p>
Increasing Milk Production	<ol style="list-style-type: none"> 1. Studies on Increasing Milk Production of Dairy Buffaloes based on Actual Dairy Farm Operations and Existing Feed Resources 	<p>P.C. Florendo, F.V. Mamuad, N. Lorenzo, R. Santiago, S. Lorenzo, H. Venturina, V. Mamuad, F. Venturina, and M. Abella</p>

APPENDIX 2 PUBLICATIONS IN SCIENTIFIC JOURNALS AND CONFERENCE PROCEEDINGS

a. Refereed Journal

Research Title	Authors	Journal Title
Short communication: Prevalence and risk factors of Subclinical mastitis as determined by the CMT test in Water Buffaloes (<i>Bubalus bubalis</i>) in Nueva Ecija, Philippines	R.T. Salvador, J.C.Beltran, N.S.Abes, C.A.Gutierrez, and C.N. Mingala	Journal of Dairy Science. 95(3):1363-6.
Detection of enzootic bovine leukosis in cattle using nested-polymerase chain reaction assay	J.A. Uera, J.V. Lazaro and C.N. Mingala	Thai Journal of Veterinary Medicine. 42(3): 213-218.
Retrospective study on the treatment of subclinical mastitis in water buffaloes	N.M.Villanada, N.P.Medina, N.S.Abes, and C.N.Mingala	Large Animal Review. 18:201-205
Kinetics of regulatory dendritic cells in inflammatory responses during <i>Trypanosoma evansi</i> infection	H.Mekata, S. Konnai, C.N.Mingala, N.S.Abes, C.A.Gutierrez, A.P.Dargantes, W.H.Witola, N.Inoue, M.Onuma, S.Murata, and K.Ohashi	Parasite Immunology. 34(6):318-29
A new loop-mediated isothermal amplification method for rapid, simple, and sensitive detection of <i>Leptospira</i> spp. in urine	N. Koizumi, C. Nakajima, T. Harunari, T.Tanikawa, T.Tokiwa, E.Uchimura, T.Furuya, C.N.Mingala, M.A.Villanueva, M.Ohnishi, and Y. Suzuki	Journal of Clinical Microbiology. 50(6):2072-4
Improved RAPD-PCR for discriminating breeds of water buffalo	R.C.Paraguison, M.P. Faylon, E.B. Flores, and L.C. Cruz	Biochemical Genetics, Aug. 2012
Enhanced expression of LAG-3 on lymphocyte subpopulations from persistently lymphocytotic cattle infected with bovine leukemia virus	S.Suzuki, S.Konnai, R. Ikebuchi T.Okagawa, T.Shirai, Y.Sunden C.N.Mingala, M.Onuma, S. Murata, and K.Ohashi	Comparative Immunology, Microbiology & Infectious Diseases. 36(1):63-69.
Effect of retinoic acid on the development of water buffalo embryos in vitro	L.A.Cajuday, A.A.Herrera, and D.H. Duran	Philippine Journal of Veterinary and Animal Science, 2012, 38(2):107-116

b. Abstracts/Paper Proceedings of Scientific Conferences

Research Title	Author(s)	Title of Proceedings
Structural Features of Egocentric Networks of Dairy Buffalo Farmers in the Philippines and their Influence on Innovation Uptake	E.P.Palacpac	Abstracts on CD-ROM of the XIII World Congress of Rural Sociology, July 29 to August 4, 2012, Lisbon, Portugal,
Assisted Reproductive Technologies and Asian Livestock Industry	L.C.Cruz	Proceedings of the 9th Annual Conference of the Asian Reproductive Biotechnology Society, October 23-28,2012, EDSA Shangri-La, Mandaluyong City Manila, Philippines pp. 20
Development of Frozen Buffalo Semen Production System in the Philippines	F.V.Mamuad and E.V. Venturina	Proceedings of the 9th Annual Conference of the Asian Reproductive Biotechnology Society, October 23-28,2012, EDSA Shangri-La, Mandaluyong City Manila, Philippines pp. 28
Cryopreservation of Goat Semen for Artificial Insemination & In-vitro Embryo Production	M.G. Beltran, G.P. Lazaro, E.C. Atabay, E.P. Atabay, E.C. Cruz, F.P. Aquino and L.C. Cruz	Proceedings of the 9th Annual Conference of the Asian Reproductive Biotechnology Society, October 23-28,2012, EDSA Shangri-La, Mandaluyong City Manila, Philippines pp. 44

(continued) b. Abstracts/Paper Proceedings of Scientific Conferences

Intracytoplasmic Sperm Injection on Bovine and Buffalo Oocytes	P.B. Pedro, E.P. Atabay, E.C. Atabay, L.C. Ocampo, F.P. Aquino, E.R.S. Maylem and L.C. Cruz	Proceedings of the 9th Annual Conference of the Asian Reproductive Biotechnology Society, October 23-28, 2012, EDSA Shangri-La, Mandaluyong City Manila, Philippines pp. 47
Strengthening the Development of Buffaloes in the South East Asia thru Research, Extension, and Cooperation	F.V. Mamuad and L.C. Cruz	Proceedings of the 3rd Rajamangala University of Technology International Conference 2011: "Technology for Sustainable Development" December 14-16, 2011 Chonchan Pattaya Resort, Chonburi, Thailand
The Use of Reproductive Biotechnologies in the Production of Genetically Superior Animals	D.H. Duran, P.G. Duran, F.V. Mamuad, V.Jamsawat, and L.C. Cruz	Proceedings of the 3rd Rajamangala University of Technology International Conference 2011: "Technology for Sustainable Development" December 14-16, 2011 Chonchan Pattaya Resort, Chonburi, Thailand
Increasing Efficiency of Artificial Insemination (AI) in Nueva Ecija	F.V.Mamuad, H.V. Venturina, R.S.Hibionada, V.L.Mamuad, V. Jamsawat, C. Saetung, and R.T. Morosco	Proceedings of the 15th AAAP Science Congress on Improving Smallholder and Industrial Livestock Production for Enhancing Food Security, Environment and Human Welfare, 26-30 November 2012, Thammasat University, Rangsit Campus, Thailand
Feeds and Feeding Management Practices	D.L. Aquino	3rd Party Training Program on Buffalo Production System, Myanmar Trainees

c. Posters

Title	Authors	Title of Proceedings/Conference
Performance of Frozen-thawed Water Buffalo Spermatozoa on Varying Time & Temperature Under Hypo-osmotic Swelling test	D.H. Duran, R.P. Mallari, E.R. Maylem, D.J.P. Suba, P.. Duran, E.A.. Abella and L.C. Cruz	Proceedings of the 9th Annual Conference of the Asian Reproductive Biotechnology Society, October 23-28, 2012, EDSA Shangri-La, Mandaluyong City Manila, Philippines pp. 66
Effect of L-carnitine Supplementation in IVF on the Motility, Livability and Fertility of Frozen -thawed Water Buffalo Spermatozoa	D.H. Duran, E.R. Maylem, M. Eduardo, D..G. Ignacio, C. Catacutan, P.G. Duran and L.C. Cruz	Proceedings of the 9th Annual Conference of the Asian Reproductive Biotechnology Society, October 23-28, 2012, EDSA Shangri-La, Mandaluyong City Manila, Philippines pp. 74
Single nucleotide polymorphisms in the water buffalo (<i>Bubalus bubalis</i>) Leptin Gene Associated with High Milk Yield with Implications to the Philippine Carabao Center's Dairy Buffalo Breeding Program	J.R.V. Herrera, A.S. Villanueva, J.F. Maramba & E.B. Flores	National Academy of Science and Technology Annual Scientific Meeting, Manila Hotel, July 11-12, 2012

APPENDIX 3 NEWLY APPROVED PCAARRD-FUNDED R&D PROJECTS IN 2012

Program Title	Project Title	Implementing Agency	Approved Budget (Php, million; rounded off)					Total
			Counterpart					
			PCAARRD	PCC	BAI*	ASBAP**	Others	
Private-Public Partnership in the Application of Animal Genomics to Increase Productivity and Improve Efficiency of the Philippine Swine Industry	Development and Application of Microsatellite Markers in Selecting Genes for Prolificacy and other Positive Traits of Swine	PCC National Headquarters	14.958	1.508	1.050	2.751	-	20.268
	Development and Application of Microsatellite Markers in Selecting Disease Resistance Genes and Screening of Genetic Defects of Swine	PCC National Headquarters	16.042	1.492	0.950	2.249	-	20.733
Science and Technology Community-Based Farm (STCBF)	Preparation and Utilization of Urea-Treated Rice Straw (UTRS) as Fodder for Dairy Buffaloes in Llanera, Nueva Ecija	PCC National Headquarters	2.306	1.357	-	-	-	3.663
	Use of Flushing and Supplementation to Enhance the Carabao-based Dairy Farms in Baybay, Leyte	PCC at VSU	2.034	0.675	-	-	0.300	3.009
	Cassava Foliage Feeding for Dairy Buffaloes in Bohol	PCC at USF	1.997	0.620	-	-	0.544	3.161
	Improving the Carabao-based Dairy Farms in Magdalena, Laguna	PCC at UPLB	2.869	0.300	-	-	0.234	3.403
TechnoMart	Enhancing the Carabao-based Dairy Enterprise in Magdalena, Laguna	PCC at UPLB	2.183	0.408	-	-	0.331	2.922
	Enhancing the Carabao-based Dairy Enterprise in Rosario, Batangas	PCC at UPLB	2.163	0.416	-	-	0.315	2.894
	Commercialization of Grass/ Forage Corn Silage for Dairy Buffaloes in Lupao, Nueva Ecija	PCC National Headquarters	3.169	1.746	-	-	-	4.915

*BAI=Bureau of Animal Industry

**ASBAP=Accredited Swine Breeders Association of the Philippines

APPENDIX 4 CONFERENCES, SEMINARS, SYMPOSIA, AND TRAININGS PARTICIPATED IN BY PCC PERSONNEL, CY 2012

DATE	TITLE	VENUE	NO. OF PARTICIPATING STAFF MEMBERS
INTERNATIONAL			
Jan 10-25	Advance on Dairy Technology	Sunchon National University, South Korea	3
Jan 22-Jul 21	Fulbright-Philippine Agriculture Scholarship Program	Veterinary and Animal Science Department, University of Massachusetts, USA	1
Apr 18-Jul 16	Training Course on Enhancing Livestock Sector Performance in the Philippines	Hankyong National University, Insilicogen, Suncheon University, Dairy Cattle Improvement Cooperation, South Korea	7
May 22-26	Dairy Management Training	Thailand	3
Jul 27- Aug 7	13th World Congress of Rural Sociology	Lisbon, Portugal	1
Jul 8-Sep 5	Basic Aspects of Animal Genetic Resources Cryobanking	Colorado State University, USA	2
Sep 13-17	Educational Tour	Thailand	5
Nov 25-Dec 1	15th AAAP Animal Science Congress	Bangkok, Thailand	1
NATIONAL			
Feb 10	Advance on Dairy Technology	Sunchon National University, South Korea	3
Feb 23-24	Fulbright-Philippine Agriculture Scholarship Program	Veterinary and Animal Science Department, University of Massachusetts, USA	1
Feb 10	How to Become Effective Document Controller	Philippine Trade Training Center, Manila	1
Feb 23-24	Advance Editorial Design	Center for Creative Imaging, Manila	1
Mar 6-9, 15-17	Strategic HR Partnering	Ateneo de Manila University, Loyola Hts., Quezon City	1
Feb 28-Mar 1	Enterprise Java with Spring	Active Learning, Inc. Manila	1
Apr 17-20	Employee Engagement and Well-being	Ateneo de Manila University, Loyola Hts., Quezon City	1
Apr 23-27	Skills Enhancement for Effective Supervision	PCC-OED, Science City of Munoz	47
Mar 21	Labor Laws	Powermax Consulting Group Inc., Manila	1
Apr 28-May 5	Brand Management	Ateneo de Manila University, Loyola Hts., Quezon City	1
May 25	How to Become an Effective Document Controller	Phil. Trade Training Center, Manila	1
May 22-23	Gene Pool Junior Supervisory Training	Phil. Trade Training Center, Manila	1
May 23-25	Basic Kubota Tractor Operation	Kubota Phils. Inc., Manila	2
May 26-Jun 1	Basic Life Support and First Aid Training	PCC-OED, Science City of Muñoz	15
Jun 21-22	Competency-based HR	Ateneo de Manila University, Loyola Hts. Quezon City	1
Jun 16	Marketing Forum	Ateneo de Manila University, Loyola Hts. Quezon City	1
Jun 26-28	Simplifying Logframe for easier Program/ Project Implementation	Development Center for Asia Africa and Pacific, UP Diliman, Quezon City	2
Jul 10-13	Laws and Rules on Government Expenditures	COA, Manila	1
Sep 3-7	Administration Surveys and FGD With Qualitative Analysis	Statistical Research and Training Center, Diliman, Quezon City	2
Oct 22-26	Course on Food Safety	College of Public Health, UP Manila	2
Oct 24-25	13th National Occupational Safety Congress	Occupational Safety and Health Center, Manila	2
Nov 6-8	Personalized Customer Service	Guthrie-Jensen Consultants, Inc. Manila	2
Nov 26-28	Good Manufacturing Practices and Processing of Foods	PCC-OED, Science City of Munoz	35
Dec 13-14	Training on Prepress Essentials	Phil. Center for Creative Imaging, Manila	1
Dec 22-23	Hands-on Training on Vermicomposting	Barfarm Agro Ventures, Manila	2

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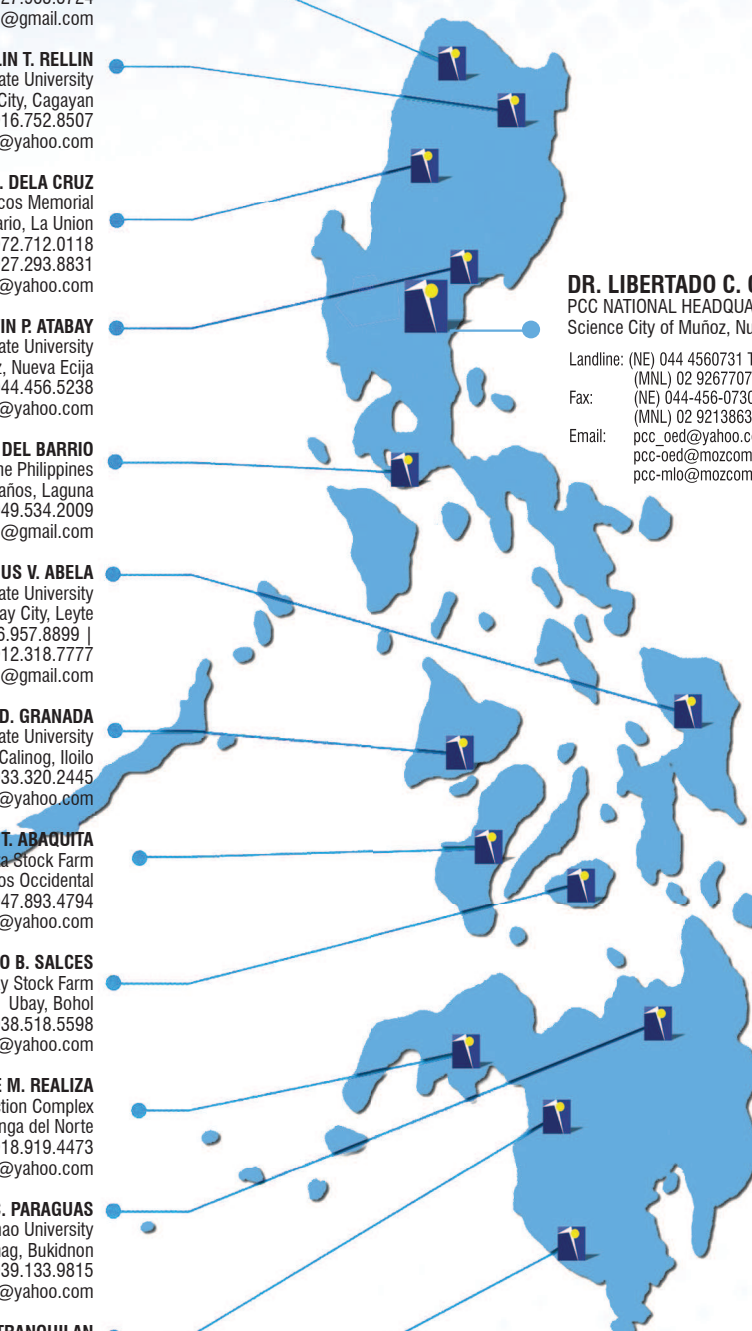
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